bacteria, amongst which were those of anthrax and cholera, lived for several days, in the case of the former twenty-one to twenty-four days, and in that of the latter thirty-five days and even longer, typhoid bacilli were destroyed already in the course of forty-eight hours in sterilised sea-water. These results tend to confirm those obtained by Prof. Percy Frankland, who, in his last report to the Royal Society Water Research Committee, states that the addition of 1 and 3 per cent. of common salt to ordinary Thames water into which typhoid bacilli were introduced, acted very prejudicially on the latter, although it stimulated the multiplication of many forms of water bacteria present in a most astonishing manner. Similar results were obtained with salted but sterilised Thames water infected with typhoid bacilli, and not only did the latter disappear very rapidly, but the typhoid colonies which were obtained on plate-cultures from this salt water exhibited in some cases a very abnormal appearance, attributable to the degeneration of the typhoid bacilli under these conditions, for on passing such colonies through a further process of plate-culture, they returned to their ordinary type.

Giaxa also experimented with fish, introducing pathogenic microbes *per os*. Unfortunately, he did not select the typhoid bacillus for these experiments, but took instead cultures of cholera and anthrax bacilli. He found that in both cases these micro-organisms were entirely destroyed in the course of a few hours. Experiments were also made with oysters and some varieties of mussel-fish. A small hole was bored in the shell, and vigorous broth cultures of anthrax and cholera bacilli were respectively introduced, after which the aperture was carefully closed with sealing-wax, and whilst some of the molluscs were replaced in sea-water, others were kept in glass dishes without any water. The latter lived for two days under these conditions. Six hours after the injection had taken place, and again at the end of twenty-four and forty-eight hours, the sealing-wax was removed and a small quantity of the fluid within the shell was taken out and plate-cultures made. In the majority of the experiments these pathogenic microbes had completely disappeared in six hours, whilst in only two instances were they detected in small numbers at the end of twenty-four hours, and in no case were they identified after forty-eight hours. These results were irrespective of whether the mollusc was kept in or out of water. In these investigations, therefore, there would appear to be no evidence that these pathogenic microbes (cholera and anthrax) were capable of being transmitted by means of these shell-fish. So far as I am aware, no one has followed up these interesting experiments, and in view of the serious allegations which have lately been made against oysters as transmitters of typhoid fever, it is a subject which might well claim re-investigation.

February 13. G. C. Frankland.

The Occurrence of very Cold Days.

It is usual to estimate cold by minima of temperature. But we may also consider it as expressed in maxima. A day may fairly be called "very cold" in which the maximum is not over freezing point. I propose to offer some account of the occurrence of such days at Greenwich in the fifty winter seasons (November to March) 1844–5 to 1893–4. (For brevity, I will designate each winter by the year in which it begins.)

These very cold days are not very frequent. In some winters there are none. The highest number is 27. The list is as follows:—

1844	13	1861	5	1878	18
45	—	62	—	79	10
46	11	63	4	80	12
47	4	64	5	81	—
48	2	65	—	82	2
49	7	66	12	83	—
50	—	67	6	84	1
51	—	68	1	85	3
52	—	69	8	86	5
53	4	70	10	87	5
54	15	71	1	88	2
55	4	72	1	89	1
56	3	73	3	90	27
57	2	74	5	91	5
58	1	75	4	92	9
59	6	76	—	93	5
60	9	77	—		
				Total	251

The total, 251, gives an average of 5·02 for each season. Ten of the winters had none of those days, and fifteen had numbers over the average.

The distribution in months was as follows:—

	November.	December.	January.	February.	March.
	6	96	111	34	4
Average	—	1·92	2·22	·68	—

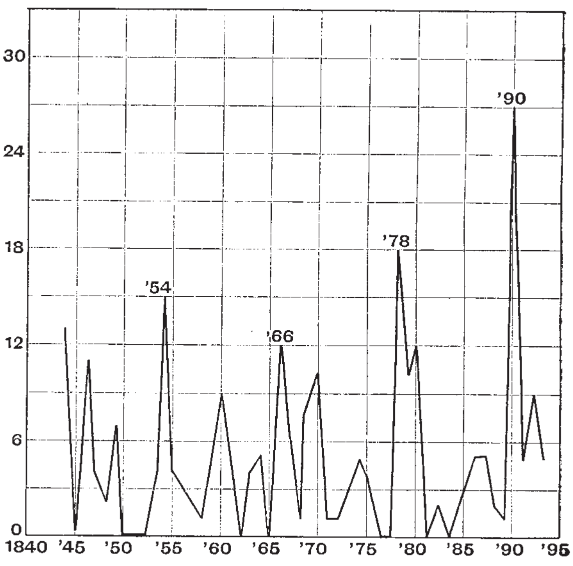
Such days are rare in November; and still more rare in March. The six cases in the former month were in 1849, 1858, 1861, 1887, and two in 1890; the earliest in the month being that in 1887 (16). The four cases in March were all in one year, 1845. January has most of such days (about 17 per cent. more than December).

The largest number in any one month was sixteen in December 1890; the next, twelve in January 1867 and January 1881.

We might perhaps note that relative maxima of the seasonal numbers occurred in 1854 (15), in 1866 (12), in 1878 (18), and in 1890 (27); giving three intervals of twelve years.

Measured by mean temperature of the three winter months, these winters were all severe (considerably under average) except 1866; in which, though January (1867) was very cold, December and February were both mild (the latter uncommonly so); thus the winter was above the average of mean temperature.

Days with Maxima not over 32° at Greenwich.



These very cold days most often come in groups (two or more in succession). The largest group was 10 in December '90; the next, 9 in January '81; then 6 in December '44, December '59, and January '93, &c.

Of the 251 days, 100 had maxima from 31° to 32°; 51 from 30° to 31°; 42 from 29° to 30°; 23 from 28° to 29°; 14 from 27° to 28°; and 21 under 27°, ranging down to 19°. The corresponding minima range from 29°·6 down to 7°·7, with greatest density about 22° to 24° (45 cases).

How are the maxima related to their respective minima? There is, of course, no rigorous proportionality; and we may often find high maxima with very low minima (*e.g.* December 29, '60, max. 31°·8, min. 10°·0), as also low maxima with relatively high minima (*e g.* January 15, '50, max. 26°·9, min. 25°·9). On an average, however, high minima go with high maxima, and low with low. Take the following:

I selected the cases in which the maxima was under 27°; there are 21. Of the corresponding minima only four were *over* 20°. On the other hand, taking the last 21 (of 46) cases in which the maximum was over 31°·5, one finds only four minima *under* 20°. The average minimum in the former case was 16°·4; in the latter 24°·4. The average difference of maxima and minima was in both cases about 8°.

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It may be useful to put down a number of the coldest of these days (reckoned by maxima). Here are 12:

	Max.	Min.	Diff.
	°	°	°
1. Jan. 5, '94 ...	19·0 ...	12·8 ...	6·2
2. Jan. 4, '67 ...	21·2 ...	7·7 ...	13·5
3. Dec. 21, '55 ...	23·2 ...	17·0 ...	6·2
4. Dec. 22, '90 ...	23·7 ...	13·4 ...	10·3
5. Dec. 22, '55 ...	24·2 ...	16·9 ...	7·3
6. Jan. 10, '91 ...	24·4 ...	12·0 ...	12·4
7. Dec. 31, '74 ...	24·5 ...	18·5 ...	6·0
8. Jan. 7, '94 ...	24·5 ...	18·1 ...	6·4
9. Jan. 16, '81 ...	24·6 ...	17·7 ...	6.9
10. Jan. 15, '81 ...	24·8 ...	14·0 ...	10·8
11. Mar. 13, '45 ...	24·8 ...	13·1 ...	11·7
12. Jan. 14, '67 ...	24·9 ...	13·9 ...	11·0

These minima, it will be seen, range from 7°·7 to 18°·5. I do not enter on the question as to the coldest days measured by minima; but from a table by Mr. Charles Harding, giving the minimum at Greenwich in each winter, 1841–89 (*Quart. Journ. of R. Met. S.* vol. xvi. p. 165), extended to '93, I take the following cases (adding the maxima since '44):

	Min.	Max.	Diff.
	°	°	°
(Jan. 9, '41 ...	4·0)		
1. Jan. 5, '67 ...	6·6 ...	32·5 ...	25·9
2. Feb. 12, '45 ...	7·7 ...	29·3 ...	21·6
3. Dec. 25, '60 ...	8·0 ...	30·0 ...	22·0
4. Dec. 25, '70 ...	9·8 ...	28·2 ...	18·4
5. Feb. 19, '55 ...	11·1 ...	33·4 ...	22·3
6. Feb. 12, '47 ...	11·2 ...	39·6 ...	28·4

The lowest (4°·0) was in '41, and so beyond our fifty years' limit. It will be observed that those six maxima are all higher than any in our first list, exhibiting a wide range in the temperature of the very cold days thus measured.

In the present remarkable season, there have been, up to February 27, 17 of our "very cold" days, viz. 6 in January, and 11 in February (an unprecedented case). The lowest maximum is 27°·0, occurring on February 6, 7, and 9; the respective minima, 15°·1, 9°·6, and 10°·2.

A. B. M.

Hesper and Phosphor.

IN his "History of the Inductive Sciences" (vol. i. p. 149, London, 1847), Whewell says:—"Pythagoras is said to have maintained that the evening and morning stars are the same body, which certainly must have been one of the earliest discoveries on this subject; and indeed, we can hardly conceive men noticing the stars for a year or two without coming to this conclusion" (*cf.* "The Planet Venus," by W. J. L., in NATURE, vol. xlix. p. 413). Now, what Whewell deemed so hardly conceivable appears to have actually occurred in old China. Wang Chung, the philosopher (*circa* 27–97 A.D.), in his work, renowned for its total repudiation of the then current errors, writes as follows:—"In the 'Book of Poems' it is said, '*Ki-ming* (Phosphor) exists in the east, and *Chang-kang* (Hesper) in the west.' In fact, however, they are but the phases of Jupiter and Venus, which, appearing now in the east, now in the west, received such distinct names from the ignorant bards" ("Lun-hang," Miura's edition, Kyôto, 1748, tom. xvii. pp. 12–13). Two facts are manifested in this passage. First, it shows that, celebrated for their astronomical acquirements in very archaic ages, as they are, the fact that the evening and morning stars are the same body, was not known to the Chinese of the eighth century B.C., when the poem entitled "Ta-tung" was composed, comprising the above-quoted line. Secondly, it shows that, even after the identity was established of the evening and morning stars, some Chinese, so well learned as Wang Chung, were ignorant of their own error: affirming that Jupiter as well as Venus appears now as Phosphor, now as Hesper, they have admitted the existence of two distinct Phosphori and two distinct Hesperi, and of a Phosphor essentially different from a Hesper. It is probable that some later scholars have tried to evade this intricacy by arbitrarily apportioning the two phases between the two planets; thus, Minamoto-no-Shita-zau, the Japanese poet and glossarist (909–983 A.D.), referring to a Chinese work "Kien-ming-yuen," which is perhaps lost now, identifies Jupiter (in Chinese: Sui-sing) with Phosphor (in Japanese: Aka-boshi), and Venus (in Chinese: Tai-peh) with Hesper (in Japanese: Yûtsutsu) ("Wamyô Ruijushô," Nawa's edition, Kyôto, 1667, tom. i. p. 1).

February 22. KUMAGUSU MINAKATA.

The Recent Storm in the United States.

THE storm of February 4–9 in the United States was notable for its extent and severity, recalling the memorable blizzard of March 1888. The Government Weather Bureau gives the following comparison of the two:—

	1888.	1895.
Snow	2 feet	5½ inches
Wind	50 miles	60 miles
Temperature at New York	4·8 above	3 below
Area	400 miles radius	1600 miles radius

It will be seen that the recent storm was more severe in everything except the amount of snow, and far more extensive. The entire southern portion of the country experienced severe cold, destroying fruits and vegetables to the value of 15,000,000 dols. in Florida alone. The zero line extended below the middle of Arkansas, and well down into Texas.

The storm reached New York on Thursday, February 7. On the previous afternoon, at about four o'clock, I observed at Brooklyn the unusual phenomenon of a double rainbow.

Brooklyn, February 11. WM. H. HALE.

SOME SUGGESTIONS ON THE ORIGIN AND EVOLUTION OF WEB-SPINNING IN SPIDERS.

IT cannot be reasonably doubted that one of the most interesting features connected with the natural history of spiders, is their habit of gaining a livelihood by spreading nets for the capture of prey. It may be that the large share of the attention of naturalists that this habit has attracted, is to be attributed to the fact that it appears to be confined in the animal world to spiders and men. This circumstance is of itself sufficiently remarkable to call for special comment; but its interest is not a little enhanced by the reflection, that since spiders made their appearance in the history of animal life vast ages before man came upon the scene, none of us can justly claim that any member of our own kind was the first in the field in the invention of the art of netting. Possibly, indeed, the oft-repeated and unavoidable observation of the efficacy of a spider's web for the purpose of catching otherwise unobtainable prey, may have roused in the brain of some intelligent hunter amongst our ancestors, the idea of the practical utility of a similar instrument for the capture of fish or other eatable forms of life. But if this be so, civilised man has long forgotten the debt of gratitude he owes to spiders. For, to the average individual amongst us, a spider is a thing to be looked upon and spoken of with fear and dislike amounting to loathing, and to be ruthlessly destroyed when a safe chance of destruction is afforded.

It is, perhaps, on account of this widespread repugnance that the science of arachnology has claimed within the last century far fewer students than many another less instructive branch of zoology. Moreover, such attention as it has received, is no doubt largely due, as suggested above, to the wonderful web-building powers that spiders possess. But those who have devoted their time to the study of webs, have, for the most part, contented themselves with observing and recording the structure and method of formation of the various types of nests and snares, and in claiming or disputing their value as a basis for a natural classification of the animals that make them. This has resulted, if in nothing else, at least in the accumulation of an array of facts sufficiently vast to

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